Ocean surface evaporation (E) and the latent heat (LH) it carries are the major
components of the hydrologic and thermal forcing on the global oceans. However,
there is practically no direct in situ measurements. Evaporation estimated from
bulk parameterization method depends on the quality and distribution of the
volunteer-ship reports which are far less than satisfactory. Spaceborne passive
microwave sensors provide an unique way to monitor ocean evaporation with
sufficient temporal and spatial resolutions and coverage for the study of global
ocean environment. For example, Liu (Liu, 1990) developed a retrieval method
for ocean evaporation using measurements by the Scanning Multichannel Microwave
Radiometer (SMMR). This method was also applied successfully to another operational
microwave radiometer, the Special Sensor Microwave / Imager (SSM/I). However,
no error analysis has been done to examine the performance limitation of current
spaceborne sensors, especially the recently launched TRMM Microwave Imager (TMI)
on board the Tropical Rain Measuring Mission (TRMM) satellite. To this end, a data
set of simulated brightness temperature at TMI frequencies are constructed with
atmospheric profiles from ECMWF reanalysis. There are totally half a million profiles
sub-sampled from global ocean covering one year time span. The simulated data
set is then binned in the multi-dimension environment variable space to
examine the sensitivities of brightness temperatures to ocean surface
evaporation. Since those sensitivity studies are based on ECMWF profiles,
no artificial or unrealistic constrains was used. With this sensitivity
information, we performed an error analysis on evaporation retrieval as a
function of environment variables including
precipitable water vapor, near surface wind speed and sea surface temperature.
It is assumed that stepwise linear multivariate relations exist between E and
brightness temperatures. The estimated error represents theoretical accuracy
limits on E estimation from spaceborne passive microwave data.